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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Preliminary reconnaissance geologic maps of the Garnet Range, western Montana

By
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Open File Report 77-529

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The information on these maps is preliminary and questionable areas have not been field checked for accuracy. The mapping was done at a level of detail that was compatible for compilation, at 1:250,000 scale, of The Butte 2° quadrangle, Montana. Slightly more detailed study was made on the overthrust-fault zone of the Garnet Range, however. These maps do not represent the standards of mapping common to U.S.G.S. 1:24,000 quadrangles, and these maps should be considered as rough-draft field compilations.

This Open-File Report shows reconnaissance geology of the following quadrangles in the Garnet Range, western Montana:

	Quadrangle name	Original scale
Figure 1.	Bearmouth----------	1:62,500
2.	Bata Mountain---------	1:24,000
3.	Chamberlain Mountain--	1:24,000
4.	Clinton----------	1:24,000
5.	Elevation Mountain----	1:24,000
6.	Greenough----------	1:24,000
7.	Mineral Ridge---------	1:24,000
8.	Sunflower Mountain----	1:24,000
9.	Union Peak----------	1:24,000

NOMENCLATURE OF ROCK UNITS

SURFICIAL DEPOSITS AND SEDIMENTARY ROCK UNITS

Qal	ALLUVIAL DEPOSITS (QUATERNARY)
Qs	LANDSLIDE DEPOSITS (QUATERNARY)
Qg	ALLUVIAL GRAVEL AND FANGRAVEL DEPOSITS (QUATERNARY)
Qod	GLACIAL OUTWASH DELTA DEPOSITS (QUATERNARY)
Qls	GLACIAL LAKE DEPOSITS (QUATERNARY)
Qop	PITTED GLACIAL OUTWASH DEPOSITS (QUATERNARY)
Qo	GLACIAL OUTWASH DEPOSITS (QUATERNARY)
Qt	GLACIAL TILL (QUATERNARY)
QTg	ALLUVIAL GRAVEL AND FAN GRAVEL DEPOSITS (QUATERNARY) AND TERTIARY)
Tg	ALLUVIAL GRAVEL AND FAN GRAVEL DEPOSITS (TERTIARY)
Ts	LAKE DEPOSITS AND VOLCANIC ASH (TERTIARY)
Tsg	LAKE DEPOSITS AND VOLCANIC ASH MANTLED BY GRAVEL (TERTIARY)
Kc	COLORADO GROUP (CRETACEOUS)
Kk	KOOTENAI FORMATION (CRETACEOUS)
Kkd	Upper calcareous member
Kkc	Upper clastic member
Kkb	Lower calcareous member
Kka	Lower clastic member
Je	ELLIS GROUP--Includes Morrison Formation (JURASSIC)
Pp	PHOSPHORIA FORMATION (PERMIAN)
Pq	QUADRANT FORMATION (PENNSYLVANIAN)
Pa	AMSDEN FORMATION (PENNSYLVANIAN)
Mm	MADISON FORMATION (MISSISSIPPIAN)
Mmc	Mission Canyon member
Mlp	Lodgepole member
Dj	JEFFERSON FORMATION (DEVONIAN)
Dm	MAYWOOD FORMATION (DEVONIAN)
Crl	RED LION FORMATION (CAMBRIAN)
Ch	HASMARK FORMATION (CAMBRIAN)
Csh	SILVER HILL FORMATION (CAMBRIAN)
Cf	FLATHEAD FORMATION (CAMBRIAN)
Ypi	PILCHER FORMATION (PRECAMBRIAN Y)
Ygr	GARNET RANGE FORMATION (PRECAMBRIAN Y)
Ymc	McNAMARA FORMATION (PRECAMBRIAN Y)
Ybo	BONNER FORMATION (PRECAMBRIAN Y)
Yms	MOUNT SHIELDS FORMATION (PRECAMBRIAN Y)
Ysh	SHEPARD FORMATION (PRECAMBRIAN Y)
Ysn	SNOWSLIP FORMATION (PRECAMBRIAN Y)

IGNEOUS ROCK UNITS

ROCK OF PROBABLE TERTIARY AGE

Ta	TRACHYANDESITE PORPHYRY
Tan	ANDESITE PLUGS, LAVA FLOWS, AND DIKES
Tadi	TRACHYANDESITE AND DIABASE DIKES
Tbdi	BASALT DIKE
Tv	UNDIFFERENTIATED VOLCANIC AND HYPABYSSAL ROCK
Tr	RHYOLITE PLUGS, LAVA FLOWS, AND VOLCANIC ASH
Tb	BASALT PLUGS, AND LAVA FLOWS

ROCK OF PROBABLE CRETACEOUS OR TERTIARY AGE

TKdi	DIABASE PLUGS AND DIKES
TKdp	DIORITE PORPHYRY STOCKS
TKgd	GRANODIORITE STOCKS AND PLUTONS
TKqm	QUARTZ MONZONITE STOCKS AND PLUTONS

ROCK OF PROBABLE PRECAMBRIAN AGE

Ydi	DIABASE DIKES AND SILLS
Ygd	GABBRO SILLS

ROCK OF UNKNOWN AGE

di	DIABASE DIKES AND SILLS

GEOLOGIC MAP SYMBOLS

CONTACT--Dashed where approximately located and dotted where covered by younger deposits

FAULT--Dashed where approximately located, and dotted where covered by younger deposits. Bar and ball on downthrown side

THRUST FAULT--Dashed where approximately located and dotted where covered by younger deposits. Queried where presence of thrust fault is suggested by stratigraphic information and by prominent trace on air photograph. Sawteeth on upper plate

ANTICLINE--Showing axis and direction of plunge. Approximately located

SYNCLINE--Showing axis and direction of plunge. Approximately located

OVERTURNED ANTICLINE--Showing axis and direction of plunge. Limbs of anticline dip in direction of arrows. Approximately located

OVERTURNED SYNCLINE--Showing axis and direction of plunge. Limbs of syncline dip in direction of arrows. Approximately located

STRIKE AND DIP OF BEDS

30 Inclined

⊕ Horizontal

⊢ Vertical

BRECCIA ZONE

SILICIFIED BRECCIA ZONE

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FIGURE 1

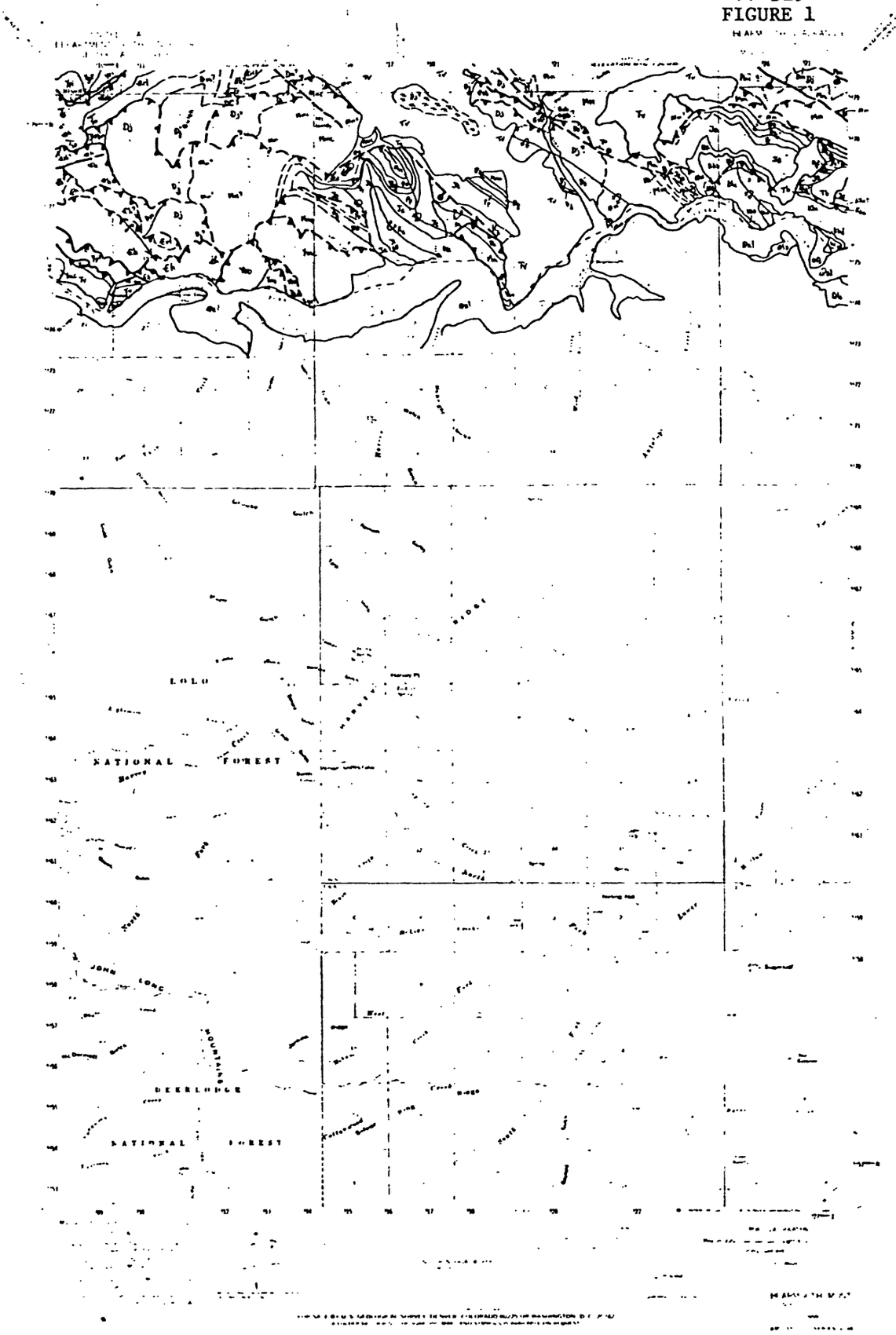

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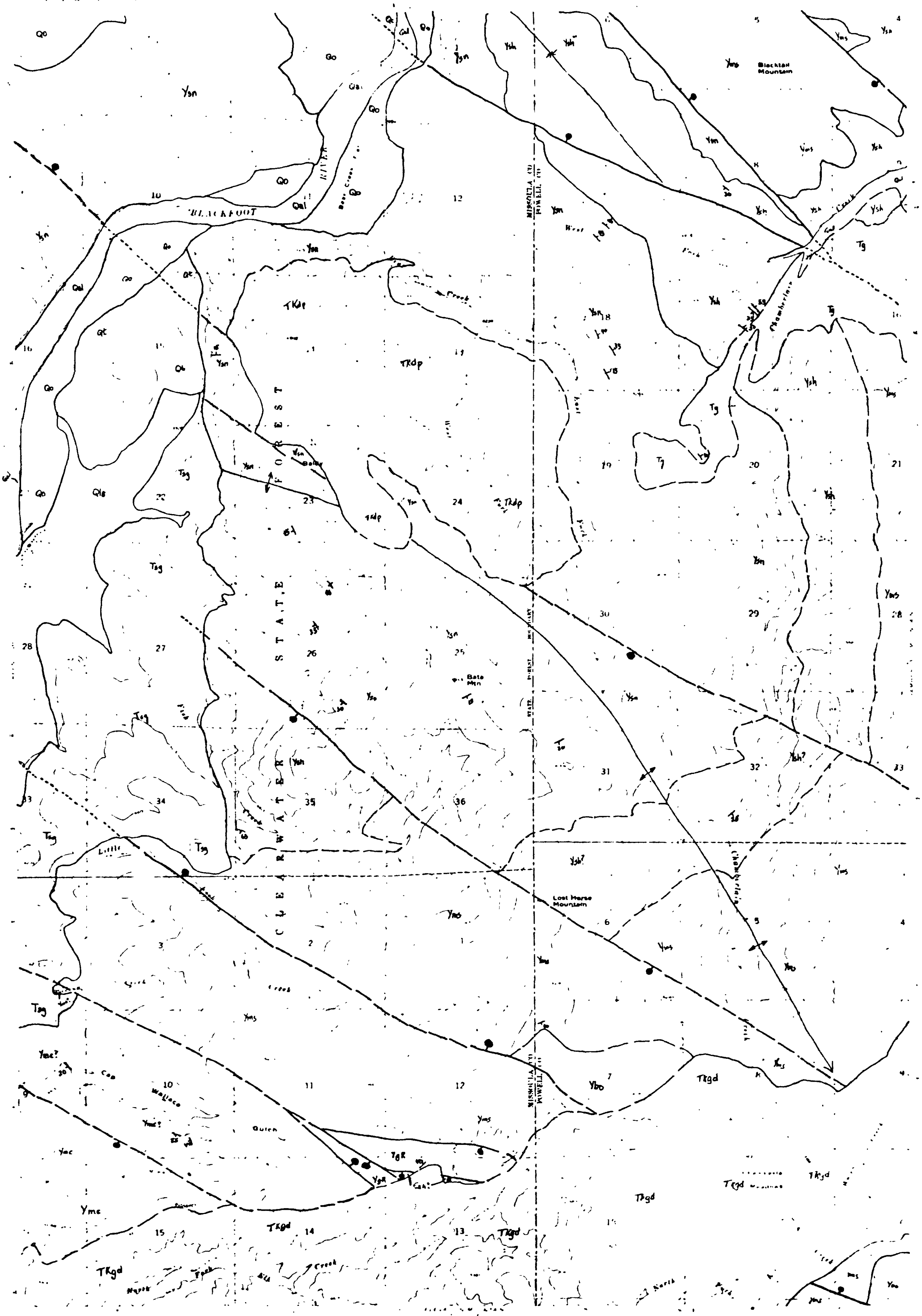
FIGURE 2



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BATA MOUNTAIN, MONT.

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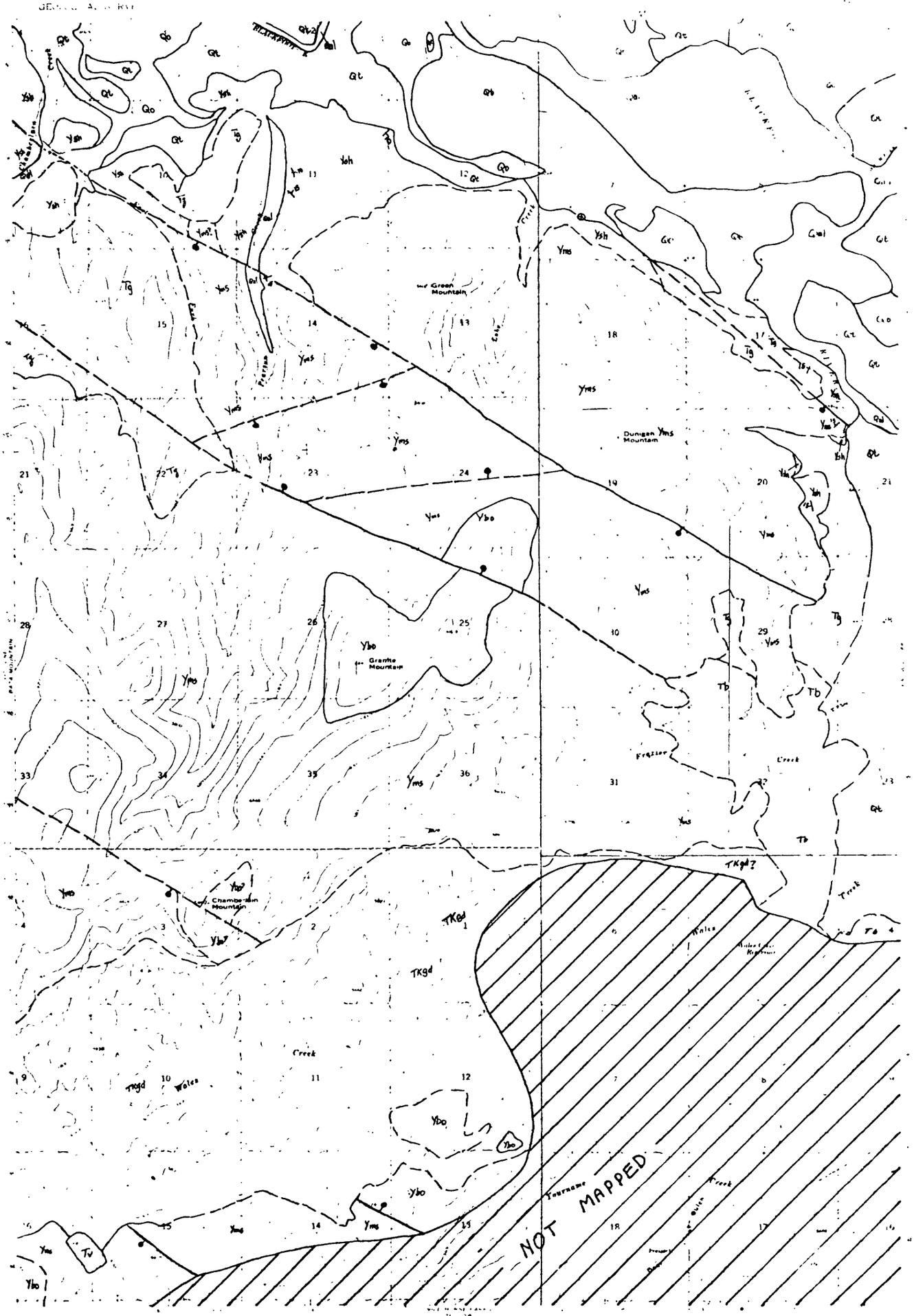
FIGURE 3



CHAMBERLAIN MOUNTAIN, MONT.

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FIGURE 4

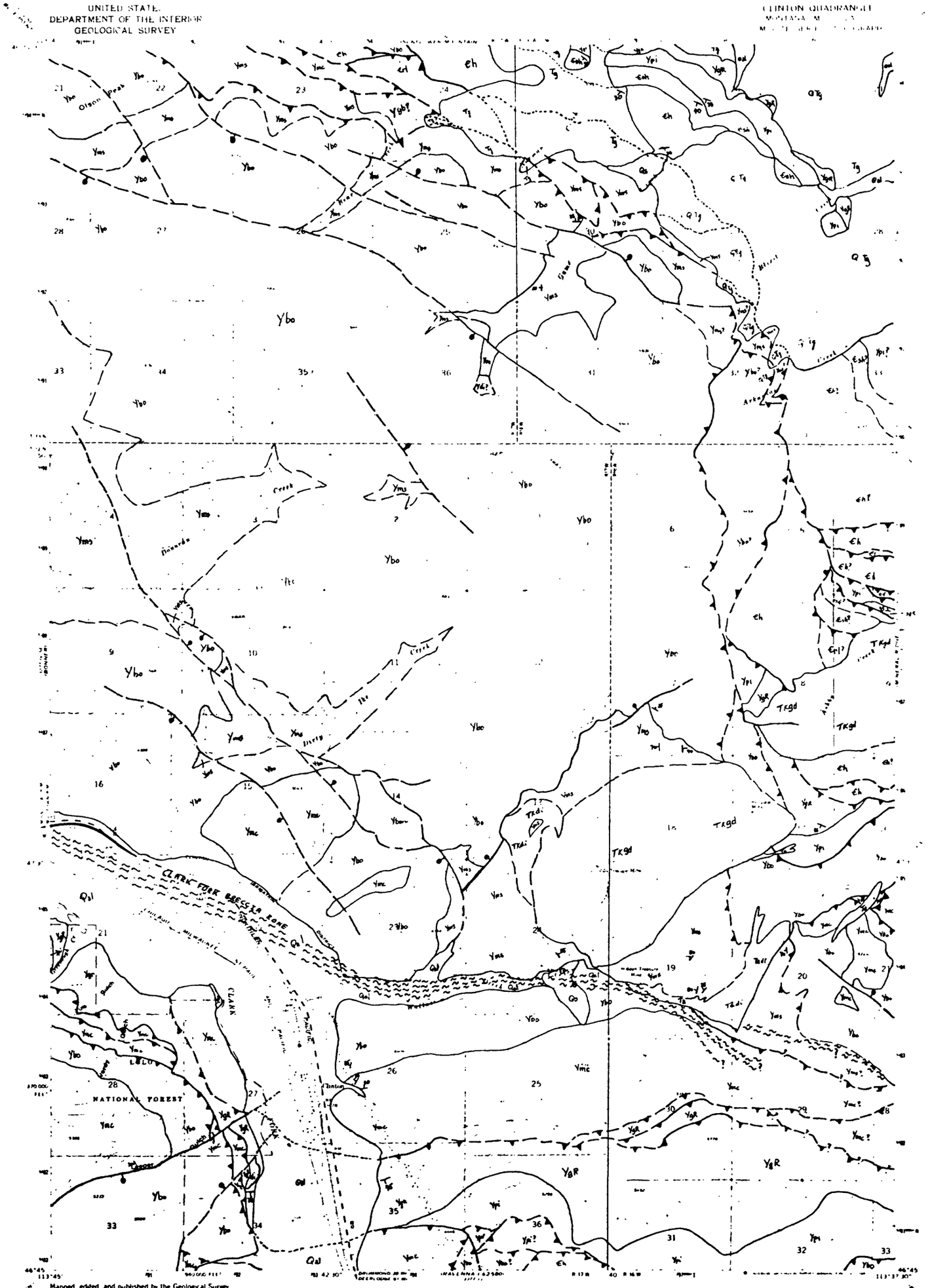

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FIGURE 5

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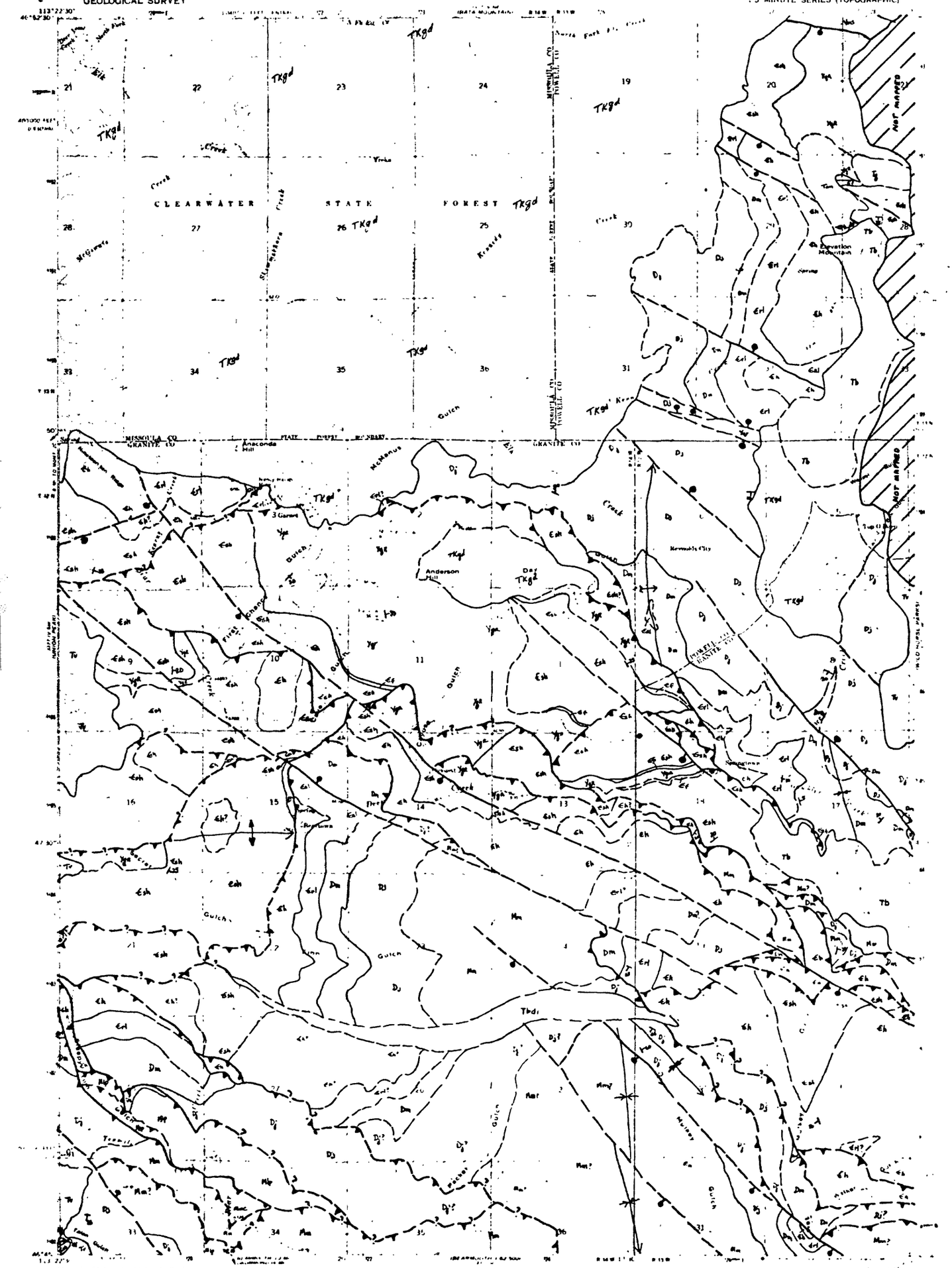
ELEVATION MOUNTAIN QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

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ELEVATION MOUNTAIN, MONT
1965

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FIGURE 6

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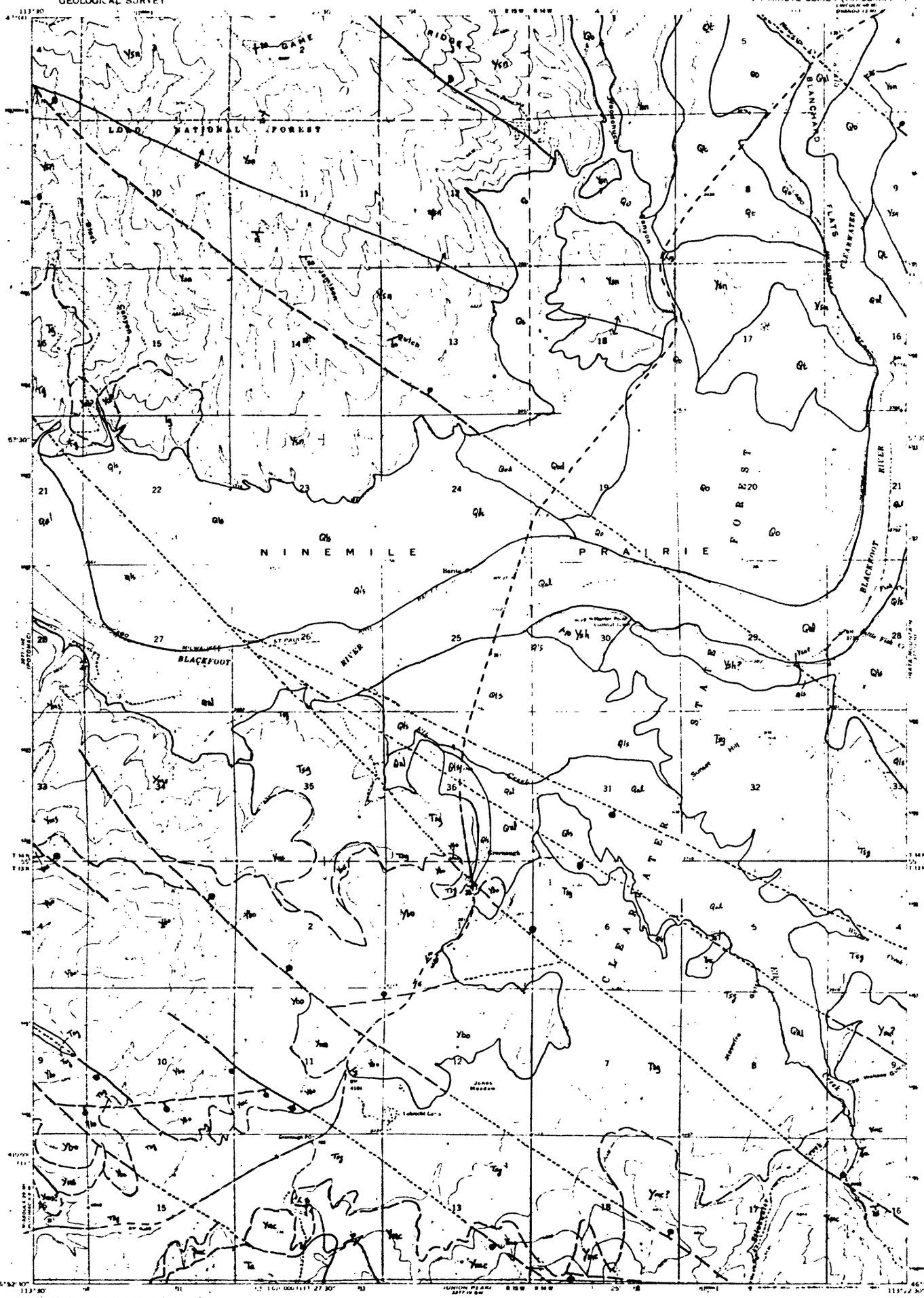
GREENOUGH QUADRANGLE
MONTANA MISSOULA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



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Topography by photogrammetric methods from aerial photographs taken 1961. Field checked 1965

Polyconic projection. 1927 North American datum
10,000-foot grid based on Montana coordinate system, central zone
1000-meter Universal Transverse Mercator grid ticks, zone 12, shown in blue

Fine red dashed lines indicate selected fence lines

CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 20-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

ROAD CLASSIFICATION
Medium duty — — — Light duty
Unimproved dirt
State Route

GREENOUGH, MONT.
1965

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FIGURE 7

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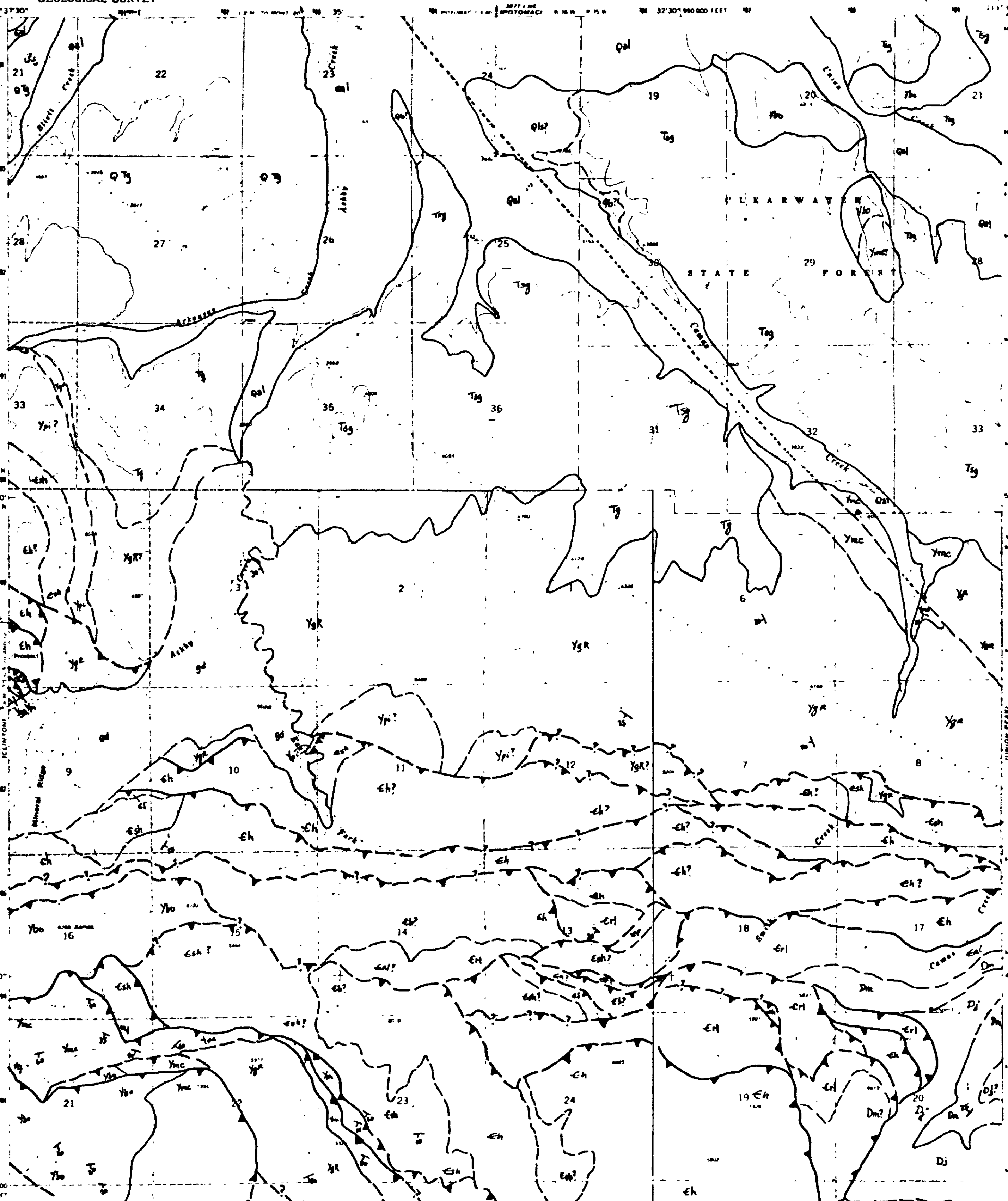
MINERAL RIDGE QUADRANGLE
MONTANA-MISSOULA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



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CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

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ROAD CLASSIFICATION

MINERAL RIDGE, MONT.

1965

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FIGURE 8

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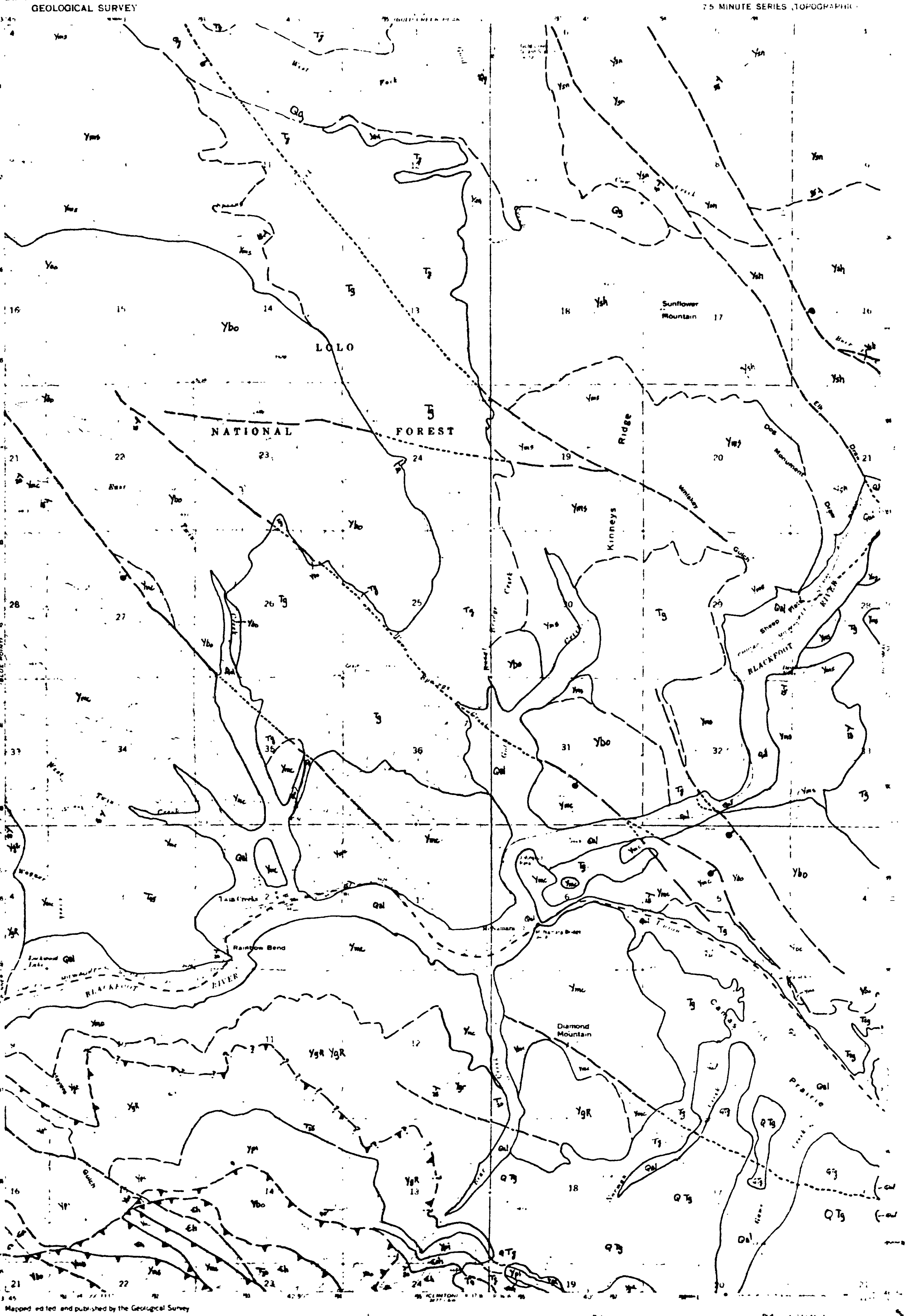
SUNFLOWER MOUNTAIN QUADRANGLE
MONTANA - MISSOULA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



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CONTOUR INTERVAL 40 FEET

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SUNFLOWER MOUNTAIN, MONT

1965

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FIGURE 9

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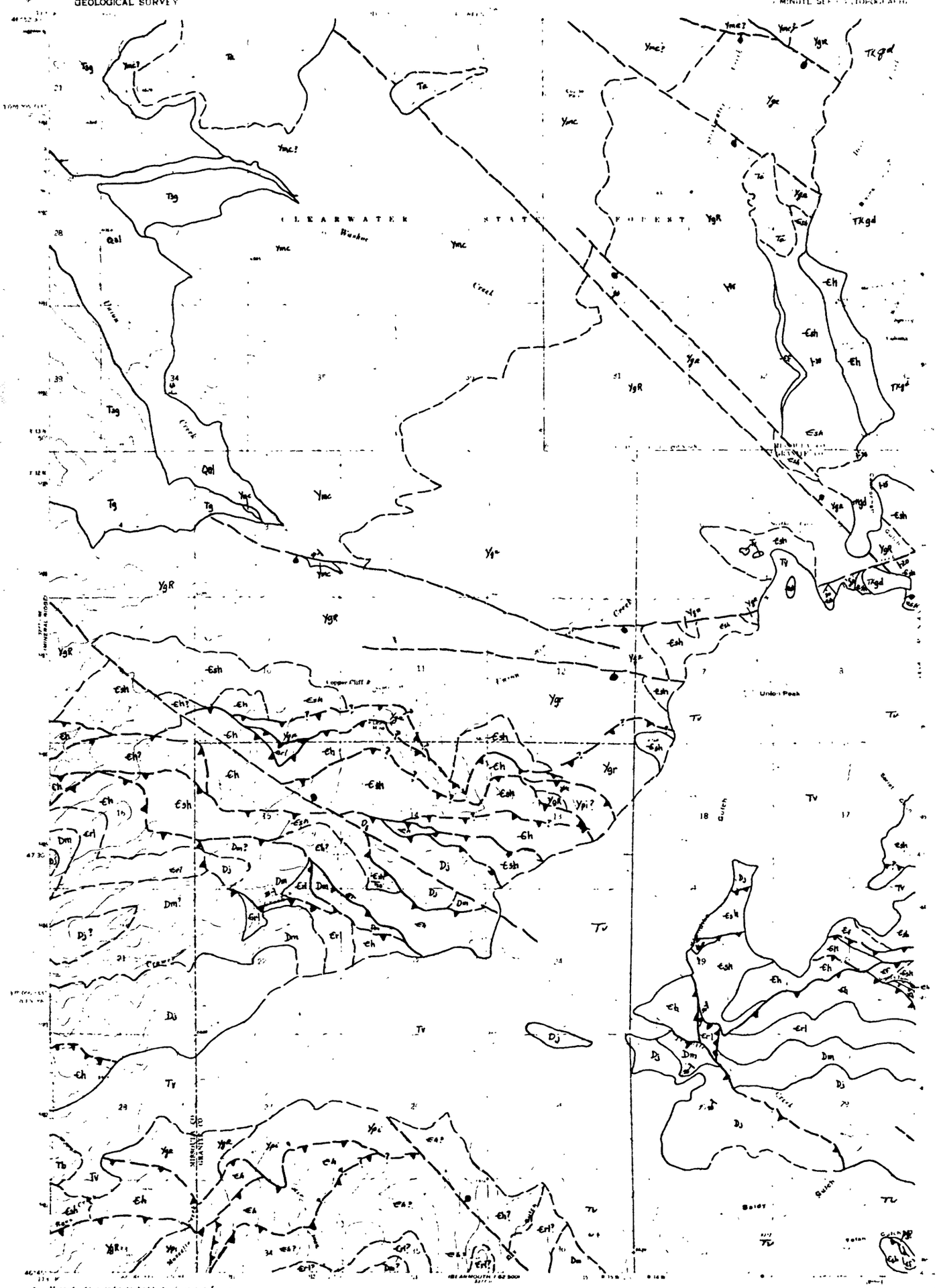
UNION PEAK QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



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CONTOUR INTERVAL 80 FEET

UNION PEAK, MONT

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CORRELATION OF MAP UNITS